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THE Chemist

SEPTEMBER, 1945 VOLUME XXII, No. 9

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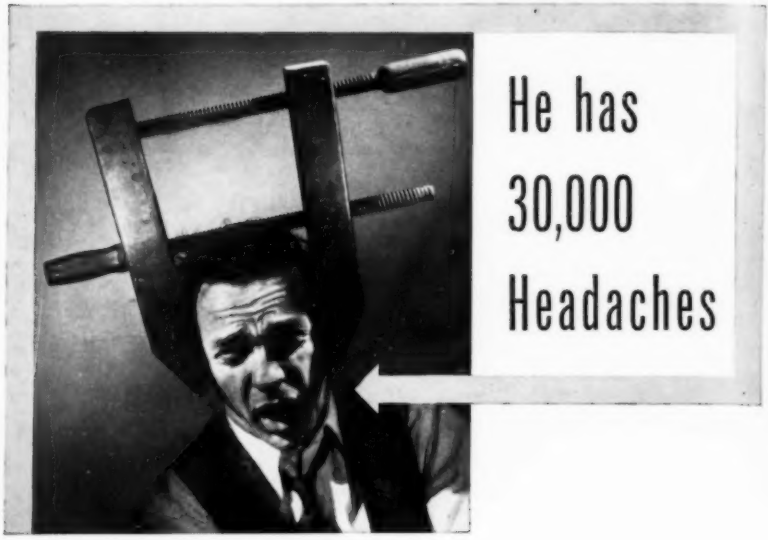

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The Chemist

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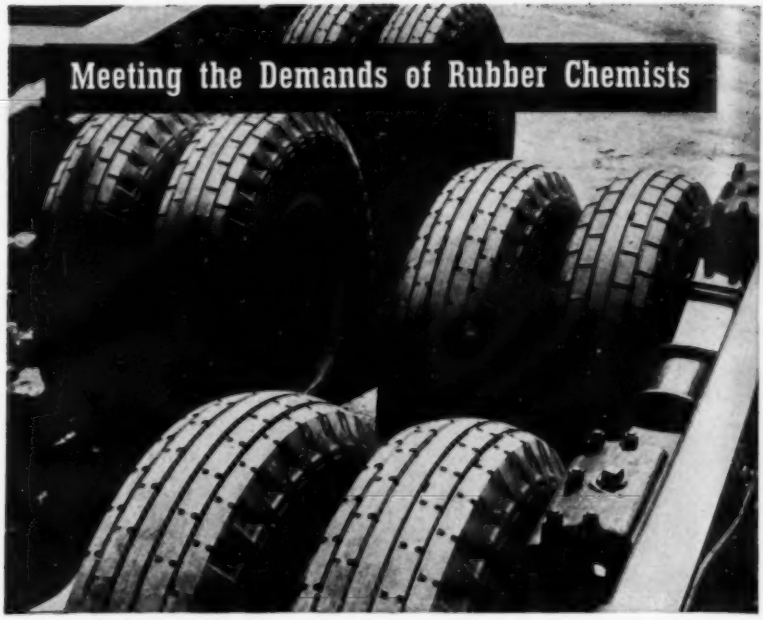

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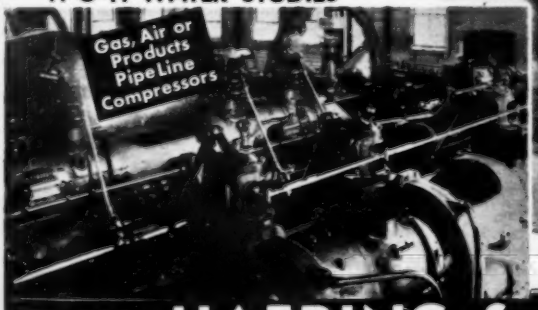

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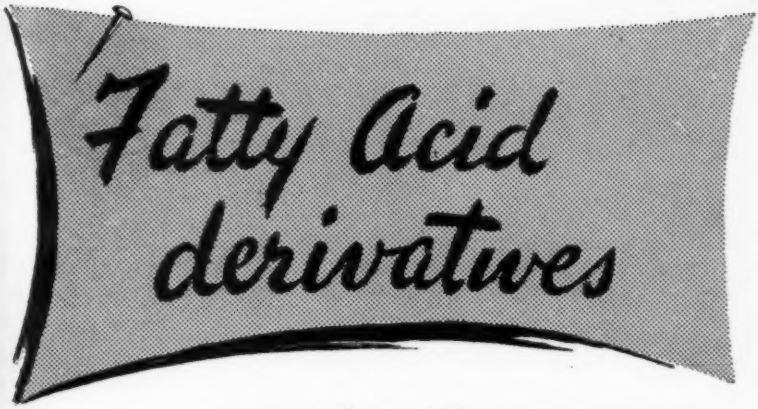

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Recent Advances in High Polymers

Dr. Paul O. Powers

Armstrong Cork Company, Lancaster, Penna.

An abstract of talks given before the Baltimore and Pennsylvania Chapters, A.I.C.

HIGH polymers cover a very wide field such as resins, rubbers, plastics, and related compounds. Many years ago experience was gained with high polymers, such as styrene and in a few instances some of the methods of manufacture were known. Although there was much secrecy about these compounds because of war-uses, today most of this secrecy has been removed.

Plastics are the coming materials, and much has been done during the war. Great improvements have been made on compounds and the development of new compounds has been visualized. Many moulding companies are moving out and going into the manufacture of raw materials. Everyone seems to want to get into the manufacture of plastics. Many of the rubber companies are developing synthetic resins while many petroleum concerns are developing synthetic drying oils.

One of the really big projects we have seen in the synthetic rubber program, is the production during the past year by industry of 800,000 to 1,000,000 tons. This one item has been of tremendous help not only to our armed forces but also to our civilian populace. From the vast amount of research has come our many synthetic rubbers which are superior in many ways to natural rubber. Considerable work is now going on in an effort to improve this rubber. GR-S, at present being used in tires, is not much different from the natural rubber. However, its one bad feature is the heat build-up.

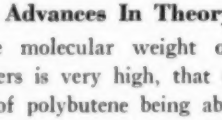
Polystyrene is playing a very important role, and in some instances will replace cellulose acetate which has held an important position; however, cellulose acetate has better flexibility than Styron. Nylon at the present time is being investigated as to its adaptability to moulding and also its adoption for lacquer materials. The phenolics which have been in use for some time are being used in many processes such as laminations, varnishes, and in exchange resins.

Often use for a certain resin is indicated, but the resin lacks all of the desired properties. The solution

to such a problem would seem to be the mixing or blending of various resins. This does not always work, however, since many of these resins are not compatible. However, the starting materials are chemically combined and are used in various combinations to give new resins with the desired properties. An example of this type is the mixture of certain thermoplastic and thermosetting resins. Under this class is Cyleweld.

Advances In Theory

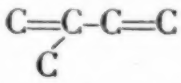
The molecular weight of these polymers is very high, that of fractions of polybutene being about one million. The length of the carbon chain, such as in polyethylene is great and the close-packed molecules cause it to be insoluble in most solvents. Part of the chain of polyvinylchloride is:



If we are to add Cl or benzene radicles to the chain we may make the compound more soluble. If we add radicles such as

to the chain we have polybutene and this causes slippage between the molecules. If we add OH (as in polyvinyl alcohol) or NH_2 (as in proteins) the resistance is increased and may be used for fibres.

Further, the solubility may be affected by the addition of double bonds as is found in butadiene and isoprene

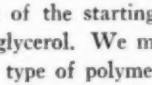


The polymers also contain double bonds, and it is through these double bonds that we have cross linkages and that process known as vulcanization.

The reactions necessary to form high polymers may be of the same type as ordinary condensation; e.g. esterification. By allowing the reaction to continue we may obtain a long chain or a large number of cross linkages. If it is desired to obtain a hard rubber-like substance, we would expect to have cross linkages. One of the starting materials would be glycerol. We may use the long chain type of polymer and produce cross links between the two chains.

Vinyl Polymerization

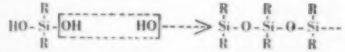
Such compounds as



will add to themselves forming long chains. However, if we wish to have a compound that is not very soluble, that is not the long chain but cross

linkages, we add an allyl group to the vinyl and through the extra double bonds we might produce the desired cross linkage, thus producing a compound resistant to solvents, hard, etc.

In producing our long chains we have made use of the carbon atom. Other elements close to carbon on the Periodic Chart may be used. One in particular, Silicon, Si, has been subjected to much experimentation. These compounds are known as the Silicones, R_2SiO.



These silicones are very resistant to heat and will make very good greases particularly when used at high temperatures.

New raw materials which may be used are:

1. Methylene disalicylicic acid.
2. Butadiene monoxide.
3. Allyl compounds.
4. Pentaerythritol (tetra hydric alcohol).
5. Dichlorstyrene.
6. Silicones.
7. Isoprene (When polymerized not like rubber. At present, we do not know how the plant produces it).
8. Myrcene. C^{10} H^{16}
9. Diglycol chloroformate.
10. Dibasic acids—azelaic acid. HOOC $(CH_2)_7$COOH

I. F. T. Elections

The Institute of Food Technologists has elected the following officers for 1945-1946; President, F. W. Tanner, head of Department of Bacteriology, University of Illinois, Urbana, Ill.; Vice-president. Victor Conquest, director of research and development, Armour and Company, Chicago; Secretary-treasurer, George J. Hucker, New York Agricultural Experiment Station, Geneva, N. Y.

The Chemists' Club Elects

The Chemists' Club, New York, has elected the following officers for 1945-1946: President, Wallace P. Cohoe, F. A. I. C.; Secretary, Lloyd Van Doren, F. A. I. C.; Suburban Vice-president, Harry L. Fisher, F. A. I. C.; Treasurer, Ira Vandewater; Board of Trustees: Joseph J. Mattiello, F. A. I. C., and Ralph E. Dorland; Non-resident Vice-president, William B. Plummer; Resident Vice-president, Chester L. Knowles, F. A. I. C.

Evans In Europe

Ward V. Evans is directing the chemical branch of study for the Army University Centers in England and France. He has selected a staff of twelve chemistry professors from universities throughout the United States, who, with military and other civilian specialists, will train enlisted personnel and officers. The teaching will be of college grade.

Alexander Fleming Fund Created

Fifteen manufacturers of penicillin have created a trust fund of $84,000, to be known as the Alexander Fleming Fund, to be used for research at St. Mary's Hospital Medical School, University of London, under the direction of Sir Alexander Fleming.

Singmaster and Breyer, 420 Lexington Avenue, New York 17, announce that Byron Marquis, Gerard E. Sonderman, Donald G. Case, and Edward H. Hilgeman have become junior partners of that firm.

Dr. Maurice L. Moore, F.A.I.C. director of the organic research division of Frederick Stearns & Company, Detroit, Michigan spoke on the role of chemistry in pharmacy before the Chemistry Club of Assumption College, Windsor, Canada, on March 15th. He delivered, on April 11th an illustrated lecture before the University of Michigan section of the American Chemical Society entitled "The Chemistry of the Heterocyclic Derivatives of Sulfanilamide." On April 13th, he lectured on "Sympathomimetic Agents" at a meeting sponsored by the Ohio Alpha chapter of Alpha Epsilon Delta, national honorary premedical fraternity, at Ohio State University.

Cornelia Snell Heads New York Section, A. C. S.

—Blackstone Studios

Dr. Cornelia T. Snell, of Foster D. Snell, Inc., Brooklyn, N. Y., has succeeded Ross A. Baker, F. A. I. C., resigned, as chairman of the New York section of The American Chemical Society. Dr. Snell is the first woman to hold the chairmanship of the Section. She is the wife of Foster Dee Snell, F. A. I. C.

Dr. Baker resigned the chairmanship to serve as civilian educational specialist on the faculty of one of the U. S. Army's Educational Centers in Europe.

The new chairman-elect, to replace Dr. Snell on the board of the Section, is Dr. Raymond E. Kirk, F. A. I. C., head of the Department of Chemistry and dean of the Graduate School of the Polytechnic Institute of Brooklyn.

The Employed Chemist and His Employer

Report of the Committee on Employer-Employee Relationships

The National Council of The American Institute of Chemists at the meeting of May 4, 1945, appointed a Committee on Employer-Employee Relationships to consider the suggestions of The New York Chapter. This committee has prepared a report in the form of a series of questions with appropriate discussion covering information that a prospective employee-chemist should know about his employer before accepting a position. It is the opinion of the committee that this information may also be of value to the employed chemist and to his employer in pointing ways in which their relationships may be improved to mutual advantage.

It is the aim of THE AMERICAN INSTITUTE OF CHEMISTS to foster the professional interests of chemists as distinct from his scientific interests. Because the majority of chemists are employed, an important part of the professional life of our members is concerned with relationships with industrial managements. The Committee on Employer-Employee Relationships realizes that the report which follows is but a start in the exploration of ways in which such relationships can be improved. It solicits the suggestions of the membership in promoting a sound course of action.

Respectfully submitted,
Committee on Employer-Employee Relationships.
E. H. Northey, Chairman
Foster D. Snell
Marston L. Hamlin
J. M. McIlvain
G. L. Royer

IN ORDER to improve the relationships between employee chemists and their employers, and as a guide to young chemists seeking employment, the Committee on Employer-Employee Relationships of THE AMERICAN INSTITUTE OF CHEMISTS has prepared and discussed

the following list of questions on matters of vital importance to the chemist seeking employment. The answers to these questions should go far to help the applicant decide which of several possible opportunities he should accept. They should also be of help to the employed chemist in evaluating his present position. Too often a number of these points are not considered until after the chemist is hired; they then become sources of misunderstanding or dissatisfaction and both employer and employee suffer the consequences. Most of this discussion is equally applicable to chemical engineers.

In interviews with employers, the behavior of many embryonic chemists is reminiscent of the frightened slave on the auction block. This creates a bad impression, because most employers desire men who have a practical business attitude and who can handle themselves well in conferences. Questions that are highly pertinent to conditions of employment should be asked without apology or embarrassment if the information is not otherwise obtained. If the company is worth working for, the man who is doing the hiring will arrive at a more favorable opinion of the applicant's intelligence and business sense, if he makes such inquiries. However, tact and courtesy must always be used, because employers will avoid hiring obvious temperamental malcontents. For this reason, the questions must be asked purely for information without implying adverse criticism of existing conditions or policies. It is well first to give the employer a chance to ask questions and to tell as much about the company and its policies as comes to his mind, then to ask the questions that remain to be covered.

This article does not attempt to advise on some of the most important questions concerning employment which must be answered by the chemist himself. One of these has to do with the nature of the work which he is undertaking, whether it is of the type to which he can devote himself with lasting enthusiasm, and whether he can accomplish it with the maximum pride of achievement. This, for the scientist, is a substantial part of his rewards. If he were interested solely in monetary return, he would not have chosen science as a career. Nevertheless, in the opinion of the INSTITUTE, he should, and is entitled to receive, compensation in proportion to services rendered and in keeping with that earned by other professional men of comparable training.

The questions herein discussed will have to do with various returns companies offer for scientific and technical service—monetary, intellectual and social, tangible and intangible.

This article is not intended as an economic survey of the chemist's status; this field has been excellently covered by the American Chemical

Society* in a report which should be studied by every applicant for a job and by every employed chemist. The present article is intended as an analysis of the main factors affecting the employed chemist's well-being and affecting reciprocal relations between him and his employer; it is intended to aid in developing norms or criteria for satisfactory employer-employee relations where the chemist is concerned; and finally, it is intended as a practical aid to the employed chemist and especially to the chemist candidate in evaluating his actual or potential job situation.

For an excellent discussion of some of the broader aspects of employer-employee relations, see "Management and Morale" by F. J. Roethlesberger, Harvard University Press.

1. What is the starting salary? Base pay? Overtime? Hours worked?

When a chemist is first employed he is largely an unknown quantity even after multiple interviews. The employer cannot x-ray a mind to find out whether its workings are good, bad, or indifferent. He cannot make a final assay of the chemist's compatibility with his fellow workers; of his tendency to play laboratory politics; of how often he will come in after a big night and be present in body but absent in spirit. Because of these facts the employer must largely depend on the word of an educational institution that the man has attained a certain degree of proficiency in chemistry. It is, therefore, logical for the employer to standardize the rates at which he will hire chemists holding B.S., M.S., Ch.E., or Ph.D. degrees. This is the practice of most large companies.

In normal times, chance and the law of supply-and-demand have governed in large measure what rates were paid. Freezing of salaries by the government during the war at a time when starting salaries were in a state of flux has made larger differences in salaries between various companies than would ordinarily prevail. Differences between pay of different companies were further determined by varying amounts of overtime worked and by salary adjustments for such overtime pay. Under these conditions, starting salaries require close scrutiny by the applicant, attention being paid to the normal number of hours worked in peace time and the base pay associated with this work-week. This is important because, presumably, this rate of pay will be resumed at the close of the war. It is thus an advantage to have a higher rate of base pay as between two otherwise equal offers of total pay.

Care must also be exercised in judging offers of different companies

*Professional Chemical Workers in War and Peace, Andrew Fraser, Jr., Reprinted from Chemical and Engineering News, 22, No. 10, 13, 16, 19 (1944).

to differentiate between the total real remuneration from a position and the size of the pay check. The value of various insurance policies, medical services, bonus and pension plans, educational and recreational facilities, vacation and sick leave payments must all be considered and evaluated to arrive at an accurate comparison of what total remuneration will be received. Of even greater importance, is a comparison of living costs in the communities near the places of work and of transportation costs to and from work. Presence or absence of state income taxes should also be considered. The total remuneration of all kinds received from the company, less taxes, and essential living costs, gives a net figure which will serve as an excellent guide for comparing the monetary rewards of rival offers.

While starting salaries are important, several other factors may outweigh such immediate financial calculations. The applicant would do well not to overvalue the starting salary, since, from a purely money point of view, the rate of pay after several years' service is obviously of more importance.

2. What is the median rate of base pay of chemists of my training after they have been with the company five years? Ten years?

This question should serve as a guide in judging comparative salaries of different companies. There is today less competition between companies for men of five or ten years experience than there is for recent graduates, hence there tend to be larger differences in median salaries paid by various companies to experienced men. (By median, is meant the salary level at which 50 per cent of the group earn more and 50 per cent earn less. This may differ from the average and is in general a better basis for comparison than the average salary). It would also be desirable to know what spread of salaries is in effect for experienced men, but employers may be reticent about divulging such information.

After employment, the capabilities of the man become evident. Perhaps he is capable but in the wrong job and should change employers. Perhaps he has hit the job in which he should advance, That should become evident in the first few months. Generally speaking, employers fall into two classes. One type gives small regular increases to all men and substantially larger increases to those of more than mediocre grade. They find places for the less capable and keep them. The second type give relatively large increases after a fairly brief time or suggest that the man look for a new employer. Each viewpoint has a justifiable use. The applicant can estimate from talking with the prospective employer what system of annual increases, if any, is in use.

Is any man who graduates with a

degree in chemistry worth a standard amount after a specific elapsed time? If so, then chemistry is less of a profession than we think and more of a craft learned only by doing. Does the man want to receive the same pay, or nearly the same pay, at the end of five years as some other chemist of lesser ability? Obviously not. He hopes to be rewarded according to his capabilities. Since abilities and accomplishments vary considerably, there should be a diverging spread of salaries with increasing years of service.

There is a trend toward rewards being based more on years of service than on ability in some of the larger companies. The applicant should bring up this subject with complete frankness to find out whether he is going to be rewarded for what he does or for his physical presence during established hours of work. In general, a mediocre man fares better in a large company, an exceptional man in a medium size or even small company. Naturally, there are exceptions to this too.

3. Who decides on increases and on what basis? Is any plan of systematic increases used?

The subject of systematic increases is subordinate to the question, who decides on increases and how. In the majority of cases, a group leader makes recommendations as to increases for his staff; the supervisor or assistant research director considers them and approves or disapproves, at the same time making his recommendation as to increases for his group leaders. The same system goes one step further up to the director of research. A matter of major importance is, "Who will know of the accomplishments of the individual man?" If his work must all filter through the group leader to the assistant director, an unfair or incompetent group leader can and sometimes does get credit for himself which properly belongs to the assistants. This is not too common, and is usually corrected before long because of the disastrous effect on morale.

It is more important to the capable young chemist that there be a mechanism for recognition of efficiency and ability than that there be a definite scale at the end of five years and ten years. What he wants most is to have his ability recognized in the salary scale.

The period between considerations of salary is important. In the best practice, salary is considered every six months with a trend toward frequent small raises rather than larger and less frequent raises. Probably the more common practice is to consider raises yearly. Unless consideration is given at least as frequently as this, there is serious question as to the desirability of the job.

4. Is advancement within the company from the ranks or are outside men brought in for top ranking jobs?

There are few companies that do not prefer to promote within the ranks. Naturally, this is a matter of the rate of growth of the company. If static, then promotion may have to await retirement or death of the men ahead in the organization. If growing rapidly, then it may be necessary to fill positions faster than the men are capable of advancement. The young chemist should not overlook the fact that if advanced in responsibility beyond his capabilities, he will suffer by it and his whole future with the company will be changed. It is seldom that a man can step down gracefully from a position which is beyond his capabilities.

If it appears that a company does not prefer to advance its own staff to openings which become available, then another serious question is raised as to the desirability of the connection.

5. How stable is the company? What are the tentative plans for the future? What was its record on scientific personnel during the depression?

The answers to these questions should enable an applicant to judge what kind of an organization he is entering. A company that has been in existence for twenty years or more, which has shown continued growth over its life-span, which is planning for further expansion, and which retained most of its scientific personnel during the depression, will have sufficient stability so that continuous employment may be expected if the employee gives satisfactory service. However, greatest opportunities for advancement may be lacking in such an organization and aggressive men may look to younger and more rapidly expanding companies where success will be apt to bring larger rewards, but where the risks of failure of the enterprise are correspondingly greater.

There are two kinds of companies it would be well to avoid. One type is the kind which mushrooms into existence in a boom period of shortages and inflated prices but is not equipped to meet the stiff competition of normal times. The other is the large, well established concern making a standard line of products and managed by ultra-conservatives or by men with "the investment-trust point of view". In time of depression the first will probably go out of business and the second will retrench on their research budget to the point of firing a large part of their scientific staff, because they consider it safe to coast along on their established products. Such a company is in a state of senescence. Its research men are likely to be discontented and subject to high turnover. Pay may be good but it is well not to be lured by it.

In general, the choice is an indi-

vidual one to be made between security and opportunity, with a civil service job representing one extreme and a newly organized business venture the other. Maximum opportunity combined with fair security will probably be found in new divisions of large, aggressive companies organized to exploit new chemical products in fields where there is an obvious demand, but where highly entrenched competition has not yet developed.

The presence or absence of technically or scientifically trained men in top management is a reasonably reliable (but not infallible) index of the opportunity the chemist will have for advancement and growth.

6. What is the policy on continuity of employment, especially in older age brackets?

Dr. M. and Dr. R. go to work for a company. Both are well trained competent chemists, and both in the course of time acquire additional competence in their specialties. But Dr. M. is a more constructive thinker than Dr. R. and has a somewhat more flexible and cooperative personality. After twenty years, Dr. M. is leader of an important group and is being paid considerably more per year than Dr. R., whose salary, however, is reasonably adequate. Dr. R. is not a group leader but is doing competent and necessary work in his specialty. Dr. R. is the patent-law-famous "man skilled in the art", useful, reliable, more than a routineer, but seldom or never troubled by a "flash of genius". Dr. M., on the other hand, frequently contributes new ideas and stimulates others to do so. Neither has ever worked for another concern.

Now, after twenty years of service, certain research projects (not connected with the work of Drs. M. and R.) turn out less favorably than expected. To be frank, they are flops. Accordingly, management decides to curtail the research budget. Suddenly it is found that Dr. R. had many failings: He is not constructive, he is not a leader, he does not make inventions (or not many, anyway), he has reached the limit of promotion. Dr. R. must go.

Why not release a younger man? Well, his salary would be less, and the consequent reduction of the budget would be too small; if two men were released, too great a reduction in available man-hours would result. So, at forty-nine, with twenty years of relatively highly specialized training behind him, Dr. R. is tossed out with three months' pay.

Dr. R's. genuine loyalty to the company is turned to bitter and vocal resentment, and the morale of the remaining chemical staff is depressed to a very low level.

This fable is not historical in all details, but such things have occurred and do occur. There are, unfortunately, employers who recognize the accumulation of no obligation to their

technical employees, having utilized the loyal results of the best years of their lives.

It is well for the prospective employee to look into the record of his prospective employer in such matters, and he should weigh outside opinion against the employer's sales talk as objectively as possible, having due regard for temperamental soreheads as well as rosy-glassed personnel interviewers.

7. What kind of contract will I be asked to sign, if any? What time of notice is required and what allowance is made on discharge?

The question of employee contracts and of employees' rights and obligations when there is no written contract is too broad and complex to be thoroughly covered here. Furthermore, it is to a considerable extent a technical legal question. Fortunately, in most practical, everyday situations the business and personal features are important and technical legal questions are not in evidence. Discussion here is limited to an attempt to touch on the major features in written employment contracts that a prospective technical employee may have to consider from a business and personal angle before signing up.

The most important features usually covered are:

1. Salary
2. Term of employment
3. Conditions of termination
4. Confidential nature of company activities and disclosures
5. Assignment of employee inventions to employer, and rewards for inventions
6. Other conditions of employment such as hours, vacations, insurance, retirement, etc., are matters of employer policy and may or may not be specifically referred to in the contract.

Contracts are, in general, of two kinds—those that cover a specific period such as one year, three years, five years, etc., and those that merely define certain conditions and run for the period of employment whatever that may be.

In considering an employment contract, as in any business deal, the prospective employee should try to evaluate what in the long run he will give and what return in the long run he will get; he should take all known factors into consideration, such as the employer's reputation as an employer, the personnel he will work with—under and over, physical resources available, etc. Then he must make his decision.

But ONE THING he must remember. Each sentence of his contract

has and is intended to have a meaning; he must try to understand it in detail, and what he does not understand he must ask to have explained. He MUST NOT rely (as is too often the case) on foggy general impressions. Most employers, especially the larger corporations, respect and desire clean-cut understanding of these matters. It is small satisfaction to the chemist and reflects little credit on the profession, if he later becomes dissatisfied because he finds he failed to understand clearly to what he and his employer had obligated themselves.

As to the specific important features listed above, the first three require little comment from the contract point of view; they are straightforward matters of negotiation and policy, considered elsewhere in this report. The next two items deserve some comment. It would clearly be impossible for an employer to put a chemist in a position of responsibility unless he could rely on the good faith of the chemist in keeping company affairs confidential, and this is usually specifically provided for in the contract. The responsible chemist will make every reasonable effort to live up to the spirit as well as the letter of this requirement; sometimes the otherwise promising career of a chemist is hampered by a reputation for loose talk. On the other hand, there is a limit to the restraints the employer can exercise after termination of employment; in general it appears that specific information as to past employers' activities—business or technical—must remain inviolate, but that the chemist has the right to use his accumulated general experience in earning his living. The chemist's sense of integrity should in general be a satisfactory guide to both parties, but in important close and contentious questions the chemist would do well to get legal advice.

As to the assignment of inventions and rewards for inventions, a great variety of policy exists among employers, ranging from no specific agreement, to the requirement that all inventions be assigned, regardless of character and circumstances. It seems clear that one of the duties of the responsible chemist, especially the research man, is making inventions for his employer, and little objection is seen to the requirement that such inventions in his employer's field should be assignable to the employer. In the case, however, of inventions made in other fields on his own time and with his own facilities, the conditions are quite different. If, for example, the prospective employee chemist has a hobby that may result in inventions (as many have), he should see to it that his interests are not infringed by his contract.

The question of rewards for invention is an exceedingly difficult one. Any fixed reward for a patent, for example, as is provided by some companies, will certainly overpay for

some and underpay for other inventions. Many companies do not pay a specific bonus for patents because such payments tend to make their personnel so patent-conscious that team-work is largely destroyed. The men who do the pre-invention research or the post-invention engineering development are as deserving of reward or more deserving, from a business viewpoint, than the patentee. Any such group achievement which makes profits for the company is best rewarded by salary increases for all involved.

8. What is the condition of the laboratory where I will work?

Two extremes of laboratories are known to the general public. One, the movie-type chemical laboratory, is overstocked with ultra-modern scientific equipment; the other, the dark hole of the inventor or scientist who had to work in his basement with meager equipment. The trained chemist knows that these laboratories are not representative of the industrial or educational plants of today but they do represent extreme types. Great advancements have come from all kinds of laboratories but a well-planned modern laboratory aids in greater output of useful work and adds to greater pride of accomplishment, which is one of the chief remunerations of all scientists.

During his interview, the chemist-applicant should insist on seeing the laboratory in which he is expected to work. He should have a mental conception of a laboratory in which he would be contented. Since most of his working hours will be in this environment, he should rate the laboratory of the proposed employer in comparison with his mind's conception of a suitable laboratory. Some of the points of special scrutiny should be the amount of desk space allotted to the chemist, availability of adequate hoods, general housekeeping in the laboratories, type and amount of chemical equipment per chemist, presence of safety equipment and the lighting, heating and ventilation.

Some organizations have spacious, well-equipped laboratories while others have a tendency to crowd the laboratory into inadequate space. This leads to the impression that laboratories are a necessary nuisance as a part of production. In the latter laboratory the environment of the chemist is not conducive to the best work. Not that a chemist must be mollycoddled and given privileged conditions, but his mind and body should not be subject to environmental strains, if he is to produce the most from his professional training. He must feel that his work is appreciated and that he is considered an essential part of the organization.

Too often, particularly in educational institutions, laboratory space is adequate, but equipment, because of apparent price, must be made by the

chemist. While this may be good experience it tends to disregard the value of a trained man's time and overemphasizes the cost of apparatus. Apparatus is a necessary part of the chemist's tools without which he cannot apply his best knowledge. It is a waste of time, valuable both to him and his employer, if he must build equipment of standard design so that he can apply his knowledge in the use and application of the apparatus.

9. What is the policy on vacations? Sick leave?

The chemist entering the employment of any organization should know the policy of the company in regard to hours of work, vacations and sick leave. In recent years, except during the war, there has been a tendency in industry toward shorter work-weeks and more liberal views on vacation periods. Many companies also have periods of sick leave for which the company will continue to pay the full salary, the lengths of these periods being limited to so many days per year and being also dependent upon years of service. However, most of this information is not presented to a prospective employee, and it is information he should have in order to avoid future misunderstandings and resentment. If he hears about them after employment, it is too late and it may be just another "gripe" against the company.

In some ways the furlough system of Civil Service in the U. S. Government offers advantages. It gives the employee a definite idea of the time off he is allowed, and within the specific rules he can use it or save it as he wishes. In this way he may feel more like a professional man in that he is able to decide somewhat for himself. He is not forced to take a vacation in the summer, if he would prefer to ski or vacation in the winter,

The length of vacation periods in most companies depends upon length of service. While this may be logical it should be a fact known to the prospective employee at time of hiring. If the chemist devotes much of his personal time to scientific reading and attending scientific meetings, he is developing his professional ability and gaining ideas which are to the ultimate profit of the company. In return for this, the employer should treat him as a professional man and reward him with a liberal attitude on "time off". However, if the chemist is only putting in his allotted time at work, then he is not truly a professional man and can expect to obey the rules of other sub-professional white collar workers.

It is the aim of THE AMERICAN INSTITUTE OF CHEMISTS to develop the professional attitude in the chemist and to see that employers recognize the chemist as a professional man.

10. Does the company offer a pension plan and if so what are the contributions of the employer and employee?

Most corporations having a modern employment policy offer some sort of a retirement plan as part of the conditions of employment. A few less advanced companies make no provision of this kind, or, on the retirement of an employee of long standing, offer him a "gratuity" which may be based on various factors, such as his years of service, his salary at retirement, and his own personal financial resources at the time. This sort of provision is both uncertain and humiliating to the employee.

Among companies with a modern employment policy, the general plan is to grant a pension to retired employees, under fixed conditions stated in advance, and on an actuarial basis. The capital for such a retirement fund is usually built up by contributions from both employer and employee, those of the employer being tax-free and subject to governmental approval. This arrangement has many advantages; the contribution of the employee gives him both a psychological and financial interest in the plan, while the contribution of the employer substantially increases the benefit and should operate to maintain a high employee morale.

The plan as usually followed has one serious defect, namely, that if an employee leaves an employer after a period of years but before retirement, he retains only the equity represented by his contribution and forfeits all advantages from the employer's contribution.

A great advance in this field could and should be made in the direction of making total accrued benefits in such fund transferable when a chemist changes his employer. The advantages of such an arrangement to the chemist-employee are obvious. There are also advantages to the community at large, and less obvious advantages to the employer. The present system puts a certain degree of pressure on the chemist not to change employment, especially after he has accumulated a substantial equity in such a fund. Accordingly, it tends to reduce the turn-over of the more volatile-minded employees on technical staffs —an advantage of the present system to the employer and perhaps also to such employees. But it also tends to keep men in positions after they have grown stale, when a change would benefit both them and their employer —a disadvantage of the present system.

Completely transferable retirement benefits would be but slightly more costly to the employer per dollar of benefit paid than the present system generally in effect. They would be likely, however, to result in a relatively small percentage increase in overall payments to retired employees

and hence a corresponding small percentage increase in employers' overall contributions. This increase should, it is believed, be more than offset by the favorable overall advantages of the plan.

Whether a system permitting such transfer could best be handled entirely by private enterprise; by private enterprise with State or Federal help; or entirely by some arm of the government, appears an open question. Little careful study and analysis has been published on this phase of the technical employment problem. It appears likely that, unless employers work out a practical solution, Federal and State Governments will become more and more involved. This may or may not be ultimately desirable, but the trend taken in the immediate future appears to depend largely on what industrial employers do.

Because the part of a pension plan contributed by the employer should in most cases be considered a part of the employee's total remuneration, the cash value of such plans should be considered in comparing salary rates between different companies. It should be emphasized that by purchasing annuities from an insurance company any employee can secure for himself the advantages of a pension plan while maintaining his freedom to change employment without loss. If the pay offered by a firm not sponsoring a pension plan were enough greater to make up the cash difference, considering taxes, it might be preferable to seek employment with that firm (providing the applicant's health is such that he can obtain annuities at reasonable rates from the insurance companies).

(*To be continued in an early issue of The Chemist*)

Stine Retires

Dr. Charles M. A. Stine retired on June 30th from the Executive Committee of E. I. du Pont de Nemours & Company. He will retain his position as vice-president and director. Roger Williams will succeed Dr. Stine.

Bradley Dewey, president of Dewey and Almy Chemical Company, Cambridge, Mass., was awarded the honorary degree of Doctor of Laws at the Harvard Commencement exercises held June 29th. President Conant's citation to him was: "A Cambridge industrialist whose herculean labors in a Federal office gave us the rubber on which we now roll to victory."

C. Olin Ball, F. A. I. C., director of the Process and Product Research Division, Owens-Illinois Glass Company, Toledo, has been granted a leave of absence to serve in Europe on a technical food project for the U. S. Army.

The Non-Technical Education Of Chemists

R. W. Gerard

Professor of Physiology, The University of Chicago

"SCIENTISTS," I have argued (1), "are autocatalysts of social evolution." They are a product of the culture in which they develop, and they, in turn, produce new culture. And scientists, far more than other groups of men, hustle and worry their society along an accelerating curve of change. We dare not try to become an encysted mass, isolated from influence by or on the body politic; it would not long tolerate such a self-contained growth. Interaction is richly present between science and society, whether we recognize and understand it or not; had we not better try to understand?

Such considerations must have been in Dr. Egloff's mind, as they are in many others today, when he asked me to write this note on the proper education of a chemist.* As a derelict chemist, I am not qualified to advise on the technical portion of this education, nor is there much that need be said at a general level.

Professional and preprofessional courses in chemistry, physics and mathematics are, on the whole, doing a superb job in forming good chemists. The chemist is well-trained as a chemist, perhaps too well trained, during his formal education. But a chemist is also a man, like other men, and he is a citizen, not quite like other citizens. His being a scientist confers on him certain opportunities and responsibilities for effective citizenship beyond those of most other men. What of his education to play these roles?

First, the less important (to society but not to the individual) education of the man. Our future chemist will probably choose a mate, establish a home, raise a family. He will make purchases, join groups of institutions, meet friends, invest earnings, and so on, In all such areas —of family, group, economic activity —there is a growing body of sound and practical knowledge. To acquire some in appropriate courses would be helpful, if the price in time is not too high. But I suspect that other more pressing demands must largely exclude this and, for that matter, courses of this sort are still pretty

*The converse problem, of what scientific education the non-scientist should receive, has been treated elsewhere (1).

tentative and unproven, and living will itself enforce some learning here.

Another aspect of learning to live, as a percipient human being, is not so likely to take care of itself. "Certain intellectual and emotional events have value to persons able to appreciate them, and bring additional pleasure and richness into these lives. Man is the highest animal only in the sense that he has the possibility of a greater variety of experience than have others, and the 'higher' type of man can savor adventures of the spirit to which the lesser one is insensate. In this sense, then, one may speak of establishing standards of and a taste for the worthy and the good — a task of esthetic education. (2)

What particular courses a young scientist should take towards this end is, of course, a matter of time, place and circumstance—this latter including the fact that many courses with fine sounding titles aren't worth a damn. But the following quotation, from an opinion I expressed when the recently-superseded University of Chicago college program was "The New Plan", (the New New Plan is even better), is worth recalling.

"The student should have glimpses of life that are new to him. He should see that there are fascinations and intricacies in a chunk of coal, a Bach fugue, an Egyptian urn, a feudal state, or a yeast cell of so great allure that thousands of men devote their lives to such concerns. No one youngster should, or could, engorge himself upon all the delicacies of knowledge or appreciation; but the finer wares of civilization should be spread before him to note and sip and taste. . . .

"From such exposure should come interests, hobbies, which will afford him individual expression and enjoyment for life, be they charcoal sketches, iambic pentameter or tuned radio circuits. But more, there should likewise result a subtle change in mental outlook. One who has even slightly sensed the enormous caution of the scientist and the panoramic view of the historian can never again be quite so certain of his opinions. Knowledge and insight breed tolerance. One can hardly dip into a study of comparative religion and remain complacent in any one creed; nor note the endless testing and evaluation of data by the scientist without becoming a little less hasty in lauding or downing new ideas, institutions and individuals.

"These, then, a college should have given its graduates: a passing contact with the wide and verdant fields of knowledge and appreciation; a lasting and vivid interest in some few patches of the whole that can happily be cultivated through life; a tendency to evaluate evidence before plunging into strong opinion; a technique for finding information as

needed. Who travels this road obtains an education."

Now to turn to education for citizenship, a term hackneyed into poverty of meaning yet a needed reality of the utmost importance for the forming scientist. Of course, I am not talking about the dreary civics courses which extoll the local virtues of Megalopolis nor even those which impart a blast of dates and names in American history. (*The New York Times* to the contrary, notwithstanding!)

Rather have I in mind a perspective of the nature of social forces and institutions, of how these have reached their present forms and which way they trend into the future. The better colleges offer courses in social science, under whatever names, which display these matters coherently. Such an elementary understanding of his social environment is at least as urgent for each man, and especially those who assume any sort of leadership, as is an understanding of his material environment. No student should be allowed to attain professional status in any field of natural science without this minimal exposure to social science. Nor is this sufficient, though it may at present have to suffice.

The scientist must know as well something of the special Sociology of Science. Viewpoints here are fresh and materials fluid; few courses have yet crystallized. But interest is astir and books and articles are tumbling into existence which will soon serve for more systematic treatment. Bernal's *Social Function of Science*, though presenting a viewpoint which some will not readily accept, is a most useful statement of the status of science in Britain. The pamphlet, *Planning of Science*, the record of an impressive conference in 1943 in London of leading British scientists, industrialists, administrators, and other specialists under the auspices of the Association of Scientific Workers, gives a contemporary and provocative presentation. A casual glance through *Science, Scientific Monthly, Science and Society*, and like journals for the past several years will reveal many valuable articles bearing on this general subject. Even the technical and official publications of great professional groups, the doctors, dentists, engineers, and chemists, are devoting increasing space to the non-technical problems of their membership. In some instances, these excursions are partisan rather than educational, and important schismatic bodies have entered the discussion.

Again, some professional schools are feeling their way into this area. Lecture series are springing up under faculty or student auspices in response to acutely-felt needs, and they are infiltrating into meetings of all sorts of professional groups. It will be a farsighted service to their own special interests no less than to the

general interest of society for chemists to foster such educational pseudopodia.

Let me particularize a little. First, the impact of social conditions on chemists. The rise and fall of universities, of research institutes, of industrial research laboratories depend on great ground swells of change, and control one sector of professional opportunities. Similarly for the flow or ebb of funds into particular scientific channels, from government, foundations, industry, great or multiple donors, and the like. The prospective chemist cannot manipulate these forces but, if he is intelligently cognizant of them, he may manipulate himself to ride them.

The student and novice pressure also will contribute to the picture, and the social status allotted by the social group to a chemist will in turn help determine this pressure. Such factors and their like account for the positions chemists will come to occupy, the number that finds none, the salary levels attained, the alignment of chemists with labor or management, the social and political influence they wield and so on and on. On such matters the student should be informed; on the facts, the trends, the history, the deeper causes, the interpretations, the expectations concerning the place of the chemist in the community.

Second, last, and the most important point of this note, is the impact of pure and applied science on social conditions. Everyone agrees that science has lifted the face of civilization and has won the war. Many also add that science has corrupted the soul of civilization and has caused the war. It has been true that scientists have had little influence over the application of their discoveries, but this cannot longer excuse us from responsibility in acquiring and exercising some influence for good.

Even in the field of health, where laboratory advances are applied entirely positively by professional men, there is much social discontent; what would happen if an epidemic of poisoning were released upon the people!

Science is closely concerned in problems of war and peace, of international relations, of production, labor and farming and so of working opportunities and conditions, of the use of leisure, or urbanization, of population size, age, and condition, of almost every current and eddy of the way men live together. And scientists must know and do something about these effects of science.

For one thing, they must help educate the public to the role science plays. Young scientists would never have been swept indiscriminately into the armed forces if their crucial and irreplaceable contribution as specialists had been really understood. Nor, at a more limited but critical point,

would anti-vivisection laws recurrently be perpetrated. This job must be done mainly through organizations — the AAAS, AAScW, CTSC, at national or regional levels, are examples—but it must be executed by individual scientists competent to write, lecture, converse and otherwise present the case of science. The alternate danger to neglecting the public is that of becoming a selfish pressure group. One can only hope for wisdom to avoid this—by insuring a broad education of scientists — and can recall that if it does happen society will sooner or later take remedial steps.

Besides educating the public, scientists must themselves be educated to the social impact of their work, especially of their applied inventions, and to ways of exercising some beneficent control. Such problems as the patent system, of expert advice to government bodies, of special expert reports, come to mind. Roosevelt's splendid invitation to Bush, to plan for the continued support of and service by science for the national welfare, is a signpost that all may read. Chemists, all scientists, must qualify themselves to respond to such challenges with a maximum of understanding and a minimum of selfish interest. They must be educated not only in science but in the sociology of science.

"I well recall from my student days a lecture which Carl Minor gave to the Kent Chemical Society under the title, 'Come out of the kitchen.' Chemists, he urged, should not remain as laboratory technologists in the bowels of great industrial organizations but should learn something of and concern themselves with the workings of the whole, and should partially emerge into managerial and administrative responsibilities. They should enter the parlor.

"Today, a quarter century later, this move has been successfully made. I make the same plea now on a broader scale to fit the contemporary situation. Chemists, all scientists, are needed for their contribution in running the whole social organization. They now have honored places at the council table of war, they should merit them at the councils of peace. Science must be applied to society and scientists must help do it. They must know something of the workings of the whole 'Society and Sons Company.' They must come out of their kitchens for part of the time." (1)

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Patent Notes

The Printing Ink Patent

Vanderveer Voorhees, F.A.I.C.

Patent Department, The Standard Oil Company (Indiana)

As part of the program of making the INSTITUTE of greater value to its members, THE CHEMIST will carry timely articles on patents, patent decisions, and patent legislation, of which this is the first. It is hoped to carry additional articles as occasion demands. Comments are welcome and will be used as the basis for the formulation of future plans.

JUSTICE Jackson recently delivered an opinion of the Supreme Court in a suit of Interchemical Corporation against Sinclair & Carroll Company on U. S. Patent 2,087,190 of Gessler, holding the claims in suit invalid (65 *U. S. Patent Quarterly* 297). The rather infrequent decisions of the Supreme Court relating to patents almost always contain something of particular interest and this decision is no exception. In recent years the attacks on the patent system have usually been reflected in the decisions of the Court and few patents which have come before the Court in the recent past have been upheld.

The Gessler patent is related to a fast-drying printing ink which employed pyroxylin with butyl carbitol as a solvent. However, Gessler did not restrict himself to this solvent but claimed other solvents having about the same boiling range. As an example of the broader claims, Claim 3 is reproduced herewith:

"A printing ink which is substantially non-drying at ordinary temperatures and dries instantly on heating of the printed matter, consisting of coloring matter dispersed in an organic viscous vehicle consisting of a liquid component and a solid component completely dissolved in the liquid component in sufficient quantity to give the ink the consistency of an ordinary oil-varnish printing ink—the solid component being a member of the group consisting of natural and synthetic resins and cellulose compounds, substantially all of the liquid component having a vapor pressure at 20°C. as low as that of diethylene glycol monobutyl ether at

> 20°C., and the major part of the liquid component having a vapor presure which at 150°C. approximates that of ethyl alcohol at ordinary temperatures and forming a stable solution with the solid component."

In the District Court where the case was first tried before Judge Symes (Southern District of New York), Dr. Gessler testified that he selected butyl carbitol as a solvent from the list in the Carbide and Carbon Chemical Company catalog, using the boiling point to make the selection. The District Court held the patent invalid in view of numerous patents on similar fast-drying inks, none of which, however, contained butyl carbitol, a relatively odorless solvent having about the right boiling point.

In the second Circuit Court of Appeals, Judge Hand in August 1944 decided that the patent was valid. Furthermore he held that Sinclair and Carroll infringed the patent with an ink employing a petroleum naphtha solvent. Quoting Judge Hand:

> "To employ an ink that would retain its consistency until the paper was imprinted and then would instantly dry on the application of an amount of heat not injurious to the paper, involved more than ordinary talent. By recognizing that some high boiling solvents volatilize rapidly upon a rise of temperature, while others remain practically non-volatile, and by defining the class useful for the purposes desired, Gessler satisfied a long-felt want. He made an ink that was not the product of a pedestrian worker in a laboratory but of a chemist of imagination who was able to conceive of and employ a solvent that had the apparently inconsistent attributes of maintaining the consistency of the ink until it had passed over the rollers and had done the printing and of then instantly evaporating, upon the application of heat, so that its surface would be dry and not rub off."

Obviously there was some confusion here with respect to the function of a volatile solvent in the ink composition and its behavior on heating.

In the decision of the Supreme Court reversing Judge Hand, Justice Jackson emphasized the greater importance of determining validity of patents rather than infringement. Deploring "the tendency among the lower federal courts in infringement suits to dispose of them where possible on the ground of non-infringement without going into the question of validity" Justice Jackson said: "Validity has the greater public importance."

The decision then pointed out that:

> "The primary purpose of our patent system is not reward of

the individual but the advancement of the arts and sciences. Its inducement is directed to disclosure of advances in knowledge which will be beneficial to society; it is not a certificate of merit, but an incentive to disclosure . . . . Consequently it is not concerned with the quality of the inventor's mind but with the quality of his product."

Those who recall the Cuno Engineering case (51 USPQ 272), in which a patent was held invalid because the inventor did not have a flash of genius when he made the invention, will note that this remark in the decision of the Supreme Court indicates a definite change in views of the Court on this question. However, the conclusion of the decision again reflects the subjective viewpoint in this statement:

"Reading a list and selecting a known compound to meet known requirements is no more ingenious than selecting the last piece to put into the last opening in a jig-saw puzzle. It is not invention."

This printing ink solvent invention may seem a bit trivial for the Supreme Court, but no doubt it is one of those cases where the Court felt it necessary to exercise its function in bringing in line a lower court decision, which in this case set the standard of invention too low. Chemists will probably agree that the broad claim above quoted was too broad, but they may not agree that invention was not involved in selecting butyl carbitol from a list of solvents and finding it to be especially effective. An obvious weakness was the admission that, after the discovery, the inventor found that petroleum naphtha was just as good.

London Chemists Indicate Meeting Preferences

The London Section of the British Association of Chemists sent out a questionnaire to its members, the results of which indicated that Tuesday or Wednesday evenings at 6:30 were preferred for section meetings. Afternoon meetings were unpopular, except that one out of five chemists indicated they would attend meetings on Saturday afternoon. Members were enthusiastic about technical subjects, but only a few cared for debates or social meetings. Sections formed geographically received more support than groups formed in factories.

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THE June meeting of the Chapter was held June 21st, at Taix French Restaurant, Los Angeles. Dr. Albert Salathe was in the chair.

The Chapter's representative, Mr. R. J. Abernethy, advised that there was no report of his committee on membership. The Licensing Committee reported that it was still at work gathering data on other successful licensing groups.

Mr. Greenhood, Chairman of the Roster Committee, reported active work in this field and that a start toward an index was being made on chemists in this territory. The breakdown would be from four angles, namely: Name, company, college education, and industry. He asked for additional volunteers for his committee. The Chair appointed a committee consisting of Messrs. C. A. Utt and L. F. Pierce to audit the Treasurer's books and report at the August meeting. The Chair then appointed a Nominating Committee for the coming year, composed of Messrs. R. J. Abernethy, Herman Maisner and Glenn Joseph.

A letter from the Institute's President was read which informed us that a house bill for the licensing of professional chemists in the State of Illinois had been presented to a committee of the Illinois State Legislature. Mr. Henning then reported on Congressman McDonough's remarks in regard to the scarcity of scientists as reported in the *Congressional Record* of June 1, 1945.

The Chair then introduced Mr. Donald M. Baker, past Chairman of the Licensing Board for Civil Engineers in the State of California, and partner in Ruscardon Engineers. Mr. Baker's talk dealt with the his-

tory of the passage of the licensing bill for civil engineers in the State of California and of the many practical problems which had arisen prior and subsequent to its passage. Among such problems were "When is a person practising engineering", and the economic side of having a successful licensing board.

His final conclusions were that although licensing was helpful, it was not a panacea for correcting economic inequalities between a professional or technical group and other bodies; but rather the basis behind the whole problem was the law of supply and demand and that a great deal could be done by controlling the grade of technologist graduated by technical schools. An open forum of discussion followed.

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AT the meeting of the Washington Chapter, held May 24th at the Wardman Park Hotel, the principal subject of discussion was the questionnaire sent out by the New York Chapter, dealing with the primary objectives of the INSTITUTE. We believe that the New York Chapter produced a timely and worthwhile document calling for the serious consideration of every member. We believe that there is much internal improvement that should be accomplished in addition to efforts devoted on the outside.

The Chapter came out with one concrete suggestion which has been forwarded to the National Council. Most of our membership comprises government employees and much interest centers around the Federal Civil Service regulations. Therefore, acting on a suggestion advanced by one of our members, there was prepared a proposal that the INSTITUTE endorse a plan providing for automatic salary promotions of chemists, beginning with Grade 1 and carrying through Grade 5. Grade 1 represents the usual entrance level, while Grade 5 represents the usual top laboratory or research position, short of administrative head or chief of a division. As the law operates now, automatic increases are provided for only within a given grade; when the top of that grade is reached, an employee may be stopped indefinitely from advancing further. This is a condition which we believe should be corrected, and the Chapter therefore seeks the endorsement of the National Council, if it so approves, to accomplish this purpose.

At this meeting, the following officers were elected for the coming term: President, L. N. Markwood; Vice-President, W. L. Hill, and Secretary-treasurer, R. E. Rostenbach. Mr. Walter J. Murphy was appointed Council representative and Mr. Hyman I. Feinstein, reporter to THE CHEMIST.

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Martin Meyer, F. A. I. C., has taken a leave of absence as chairman of the Department of Chemistry at Brooklyn College, Brooklyn, N. Y., to serve with the Educational Division of the United States Army as a civilian educational specialist in the European area.

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SYNTHETIC RUBBER FROM ALCOHOL By Anselm Talaly and Michael Magat. *Interscience Publishers, Inc.*, 1945. 298pp. 6"x9". $5.00

This book is a survey of the production of butadiene from alcohol and is based mainly upon the Russian literature. The book fills a long-standing need in this field being an excellent exposition of the Lebedev and S. K. processes of producing butadiene from industrial alcohol. Most of the butadiene in this country at the present time is produced from alcoholic liquors and for this reason the compilation of information contained in the book is of especial interest.

A considerable amount of the book is devoted to a rather complete description of the Lebedev and S. K. processes both from an industrial and laboratory point of view.

The effects of catalyst, temperature, and chemical structure of the alcohol are covered thoroughly and the physical chemical processes described with great clarity. The polymerization of butadiene occupies the attention of the authors in a good third of the book, both the emulsion polymerization and sodium polymerization being covered in detail.

The remainder of the book is devoted to the physical chemistry of the solid rubbers and solutions of the rubber. The kinetics of polymerization in emulsion form, as well as mass polymerization kinetics, are described.

The effects of various physical and chemical conditions, such as temperature, time, electrolytes, and so forth, are described in detail. Sodium polycondensation is covered with a thoroughness not usually found in English language books.

—John B. Rust, F.A.I.C.

Science, The Endless Frontier

Dr. Vannevar Bush, director of the Office of Scientific Research and Development, in a 184 page report, dated July 1945, to the President of the United States, entitled "Science, the Endless Frontier," recommended that a National Research Foundation be created to aid research and that scholarships be made available to talented students in science.

The report was prepared at the request of the late President Roosevelt, who asked that recommendations be made on four subjects, which may be summarized as: (1) What information should be given the world about our scientific contributions during the war. (2) What program can be organized to continue the war against disease. (3) What can the Govern-

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ment do to aid research activities by public and private organizations, and (4) Can an effective program be proposed for discovering and developing scientific talent in American youth.

Dr. Bush was assisted in the report by committees headed by Dr. W. W. Palmer, Bard professor of medicine, Columbia University; Dr. Isaiah Bowman, president of Johns Hopkins University; Dr. Henry Allen Moe, secretary-general of the John Simon Guggenheim Memorial Foundation; and Dr. Irvin Stewart, executive secretary of the Office of Scientific Research and Development.

In summary, the report recommended that military research must be continued through a civilian-controlled organization with funds from Congress and close liaison with the Army and Navy. Government financial support should be extended to basic medical research in the medical schools and universities. A Science Advisory Board should be created in the Government. The Government should support basic research. It should provide incentives to industry to conduct research by clarification of taxation laws on funds used for research; by strengthening the patent system, and by bringing new scientific knowledge to industries which do not now utilize it. Talented students should be given scholarships and graduate fellowships, if needed, in order to develop scientific talent.

The creation of a National Research Foundation to carry out this program was recommended, to be divided into Divisions of Medical Research, Natural Sciences, National Defense, Scientific Personnel and Education, and Publications and Scientific Collaboration. Recommended budget for the first year is thirty-three and one-half million dollars, to be increased by the fifth year to one-hundred twenty-two and one-half million dollars.

The complete report may be obtained from the Superintendent of Documents, Washington, D. C. at a cost of thirty cents.

The Special Libraries Association, 31 East 10th Street, New York 3, N. Y., announces the publication of "A List of Subject Headings for Chemistry Libraries". This list, consisting of sixty-four planagraphed pages, may be obtained from the Association for $1.50.

Chemical Condensates

Ed. F. Degering, F.A.I.C.

Patulin, which is derived from the mold that produces penicillin, has been reported successfully used by Dr. Gye of London in the treatment of colds.

One cause of high blood pressure, according to Martin of New York, may be a deficiency of riboflavin.

Radio frequency waves have been applied, by workers at Cornell University, to the separation of fertile from non-fertile eggs.

The Gelatin Products Company are producing about 4,500,000,000 capsules annually.

Preliminary reports by Shannon indicate that the oral ingestion of thiamin chloride will relieve the itch of mosquito bites and prevent further biting. A dose of 80 to 100 mgms. on the first day and about 10 mgms. per day thereafter is considered to be sufficient.

The Glenn L. Martin Co. has developed a plastic inner tube for tires, which is claimed to be superior to natural rubber tubes.

According to the Harvard Medical School, plastics from blood plasma are used in the treatment of burns.

Methylolurea, which is prepared by compounding urea with dimethylolurea, is destined to play an important role in the post-war period in the treatment of lumber. This treatment makes timber much harder, stronger, stiffer, and more durable.

In 1911 approximately 350,000 *pounds* of rayon were produced in the United States, whereas the present production is at the astounding rate of 350,000 *tons* per year.

A $3,600,000 plant is planned for Eugene, Oregon, for the production of methanol from sawdust and waste wood.

A plant for the production of 2,000,000 gallons of 190-proof alcohol annually, from waste sulfite liquor, at Bellingham, Washington, has been authorized by the W.P.B.

Dynafuel, according to J. Howard Pew of Sun Oil Company, is fifty per cent more powerful than United States standard 100-octane test fuel.

Sodium carboxymethylcellulose, which is a water soluble stabilizer and emulsifying agent, is being produced by Hercules Powder Company.

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Rockefeller Grant

A Rockefeller Foundation grant of $335,000 to the National Research Council has been announced. The grant is to be used to provide postwar fellowships to those who had to interrupt graduate education to go into war work. The fellowships will thus enable qualified students to devote their full time to work toward the Ph.D. degree.

Beach Wins Hyatt Award

The fourth annual John Wesley Hyatt Award for outstanding achievement in the plastics industry was presented June 13th to William Iler Beach,, chief plastics engineer of North American Aviation, Inc., Inglewood, California, for his work on the postforming of laminates, which made possible the manufacture of certain critically needed parts for the aircraft industry.

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Charles H. Slater, division sales manager of fine and industrial chemicals, will assume, in addition to present duties, the supervision of advertising and publicity. Some years ago, Mr. Slater was manager of the company's New York office.

Creese Heads Drexel

Dr. James Creese, vice-president of Stevens Institute of Technology, has been elected president of Drexel Institute, Philadelphia, to succeed Dr. George P. Read.

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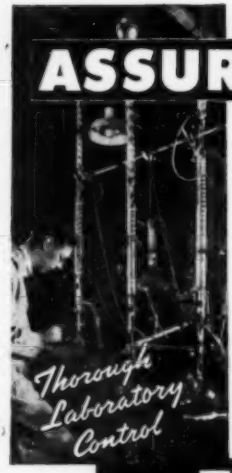

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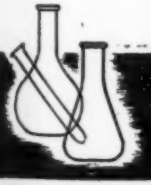

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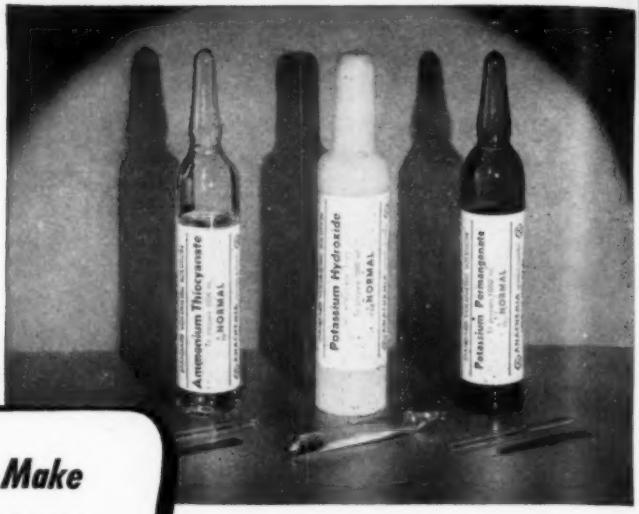

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Acculute solutions in sealed ampoules are convenient to store and remain stable indefinitely . . . . and the standard volumetric solutions prepared with them are dependable.

Complete instructions for preparing Acculute and a formed glass rod for opening are supplied with each ampoule. Advice concerning end points, titrations and scientific references are supplied with each unit.

Necks of all glass ampoules are prescratched so that an ampoule can be easily split into two parts by merely heating the glass rod supplied with it, and applying the heated rod to the scratch. Wax ampoules (containing alkali solutions carbonate free) are opened by simply passing the heated rod through the head.

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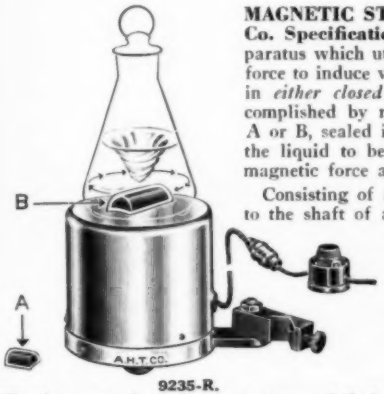

9235-R.
Showing general stirring in a stoppered flask

MAGNETIC STIRRING APPARATUS, A.H.T. Co. Specification. A compact, quiet-running apparatus which utilizes a rotating field of magnetic force to induce variable speed stirring action within *either closed or open vessels.* Stirring is accomplished by means of a small magnetized bar A or B, sealed in Pyrex glass, which is placed in the liquid to be stirred and which is rotated by magnetic force applied below the container.

Consisting of a permanent bar magnet attached to the shaft of an electric motor and mounted in an aluminum housing with flat top 4⅜ inches diameter and 4¼ inches high. Can be used either on the table or on a support rod, attached by means of a clamp with swivel joint.

Suitable for any stirring operation which involves 1 ml to 1 liter of liquids with viscosities up to that of a 50% glycerol solution. Particularly convenient for use in closed systems where:

Gas volume changes must be observed, as in hydrogenation experiments;
High vacuum or overpressure should be maintained;
Moisture and air should be excluded, as in titrations involving the use of Karl Fischer reagent;

Gas phase over the surface of the liquid should not be mixed into the solution;

Change in turbulence is required without disturbance of heavier phase above stirred portion;

Small containers are used, as in microchemical procedures.

Any type of vessel of glass, porcelain or non-magnetic metal can be used, i.e., flasks, beakers, culture dishes, crystallizing dishes, evaporating dishes, test tubes, weighing bottles, etc. A ring-type burner is suitable when stirring at elevated temperatures.

9235-R. Stirring Apparatus, Magnetic, A.H.T. Co. Specification, as above described, with one each stirring bars A and B, ⅜-inch and 1½ inches long respectively, rheostat, 8-ft. connecting cord and directions for use, but without glass vessel. For 115 volts, 60 cycles, a.c. only.....**32.35**

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